



# Implementation of Heart Rate Monitors in High School Physical Education

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#### **General Information**

#### Problem

The Centers for Disease Control and Prevention (CDC) recommend "that children and adolescents participate in at least 60 minutes of moderate intensity physical activity most days of the week, preferably daily". However, according to the 2007 Vermont Youth Risk Behavior Survey only 26 percent of students in grades 8-12 report having participated in 60 minutes of physical activity per day every day<sup>2</sup>. Furthermore, a recent study found that by age 15 only 31 percent of children met the CDC recommended level of physical activity on weekdays, and 17 percent met the recommended level on weekends<sup>3</sup>.

#### Rationale

Adequate physical activity is clearly associated with improved student health but research also indicates that benefits of aerobic exercise extend to learning as well. For example, a 2005 study found that higher academic performance among students in grades five through nine was positively correlated with higher levels of student fitness<sup>4</sup>. In addition, the Vermont State Board of Education requires that schools implement standards-based assessment in high school physical education. Heart rate monitors are a sound, objective measurement tool to assess student engagement in moderate to vigorous physical activity. This technology also has the potential to increase student motivation during physical education. In the words of a Vergennes Union High School student, "the heart rate monitor keeps me from getting lazy in the middle of my workouts." Finally, as Vermont schools move toward a transformed education system this technology can advance development of students'  $21^{st}$  century skills.

#### Goals

The goals of this physical education heart rate monitor program are to:

- 1. Document and increase the amount of time high school students spend engaged in moderate to vigorous physical activity during physical education.
- 2. Develop student self-knowledge, personal goal setting and fitness planning skills for lifetime physical activity.
- 3. Develop students' 21<sup>st</sup> century skills of tracking, interpreting and evaluating personal physical activity effort with objective, technological measures.

<sup>&</sup>lt;sup>1</sup> Centers for Disease Control and Prevention, 2008

http://www.cdc.gov/nccdphp/dnpa/physical/everyone/recommendations/children.htm

<sup>&</sup>lt;sup>2</sup> Vermont Department of Health, 2007 Vermont Youth Risk Behavior Survey. http://healthvermont.gov/pubs/yrbs2007/yrbs 2007b.pdf

Nader et al. (2008) Moderate-to-Vigorous Physical Activity From Ages 9 to 15 Years". JAMA. 2008;300(3):295-305.

<sup>&</sup>lt;sup>4</sup> Grissom, James. (2005) "Physical fitness and academic achievement". *Journal of Exercise Physiology online*. v8, n1.

#### **Eligibility**

Any Vermont public school with grades 9-12 may apply for this grant. Each school may submit only one application. Ineligible schools or consortia of schools include those who are past recipients of this grant and past recipients of the federal Carol M. White Physical Education Program (PEP) grant.

#### **Awards**

This grant will fund the purchase and implementation of heart rate monitors for high school physical education programs. Three schools will be awarded funding of up to \$9,000 for the purchase of heart rate monitor equipment and other implementation costs. All equipment purchases must follow conditions of grant receipt listed on page four. These are competitive grants. **Funding is contingent upon legislated budget approval.** 

#### **Application Review**

All applications will be evaluated by a diverse grant review committee according to the scoring criteria listed on page eight. The narrative questions are outlined on pages nine through ten and example grant objectives, activities and timeline are provided on pages 11-13.

#### **Timeline**

Application deadline: The application with original signature *and six copies* must be

received by 4:30 p.m., September 18, 2009. Faxed or e-mailed

copies will NOT be accepted.

Grant recipients announced: By October 9, 2009

Grant completion date: Activities and expenditures must be completed by June 30, 2010.

Final grant report due June 30, 2010.

#### Questions

If you have questions about this application, please contact Lindsay Simpson at (802) 828-1461 or <a href="mailto:lindsay.simpson@state.vt.us">lindsay.simpson@state.vt.us</a>

Applications for School Wellness Grants must be received no later than 4:30 p.m., September 18, 2009.

Any application that does not meet this deadline will not be considered.

#### **Conditions of Grant Receipt**

#### All grantees must:

1. Have or establish a school/community-based project committee to implement the activities of this grant. This committee must include representatives from the first list of mandatory members, but preferably all of the following:

#### **Mandatory Committee Members**

- Physical education teachers
- Other content educators (ex: health, mathematics, technology, science, language arts)
- Technology specialist
- Students

#### **Additional Committee Members**

- School administration
- Parents
- Other community members
- 2. Send **all** school physical educators **and** a technology specialist to a two-day heart rate monitor technology training provided by the Vermont Department of Education. There is no cost for this training. The workshop will be held toward the end of October 2009. The location will be decided when grant recipients are identified.
- 3. Provide required technology to support the heart rate monitor program software (see Appendix A).
- 4. Implement the use of heart rate monitors during a minimum of 50% of class days for at least one physical education course. Then phase-in use of technology with other physical education classes. Awarded schools must also share aggregated student heart rate monitor data with the Vermont Department of Education. Finally, implementation must follow the Vermont Department of Education's protocol for equipment maintenance and cleaning.
- 5. Host one to two visits by the Vermont Department of Education's Physical Education Consultant to observe implementation of this program.
- 6. Complete a final program evaluation report using forms provided by the Vermont Department of Education. The final report will include:
  - Teacher feedback
  - Student heart rate monitor data
  - Student assessment results

Awarded schools that do not comply with the above conditions of grant receipt will be required to return all equipment purchased through this grant to the Vermont Department of Education.

#### **Completing the Application**

- 1. **Complete** the Cover Page and Signature Page. (Cover Page can be handwritten.)
- 2. **Type** responses to all narrative questions and budget sections.
- 3. **Mail** or hand-deliver the application with original signature **and six copies** to the address below. **Faxed or e-mail copies of grants WILL NOT be accepted.**

	School Wellness Grant	
Application Recipient	Lindsay Simpson Physical Education Consultant Vermont Department of Education 120 State Street Montpelier, VT 05620-2501 (802) 828-1461 lindsay.simpson@state.vt.us	
Application Deadline	Received by 4:30 p.m. September 18, 2009	

#### All grant applications must include:

One original copy of complete grant application with signatures plus six copies
Cover page
Signature page
Narrative responses to school wellness grant questions* (not to exceed four pages)
Budget (one page maximum; separate page)
Appropriate attachments (separate pages)
All responses must be typed, 12-point font, single-spaced with 1" margins

<sup>\*</sup>Specific scoring criteria, narrative questions and application examples for objectives, timeline and budget are provided. The page numbers for these sections are listed in the table of contents.

# **Cover Page**

# **Programmatic Contact Information:**

Name of School	Name of Supervisory Union
Grades Served (Pre-K-12)	Number of Students (total)
Contact Name	Title
Mailing Address	
Telephone	Fax
E-mail	

# **Fiscal Agent Contact Information:**

Fiscal Agent	
Contact Name	Title
Mailing Address	
Telephone	Fax
E-mail	

# **Signature Page**

Check the appropriate box reg	garding your scl	hool/community	y-based project committee:	
☐ It is not yet in existence.				
☐ It has been in existence for l	ess than one yea	r.		
☐ It has been in existence for i	more than one ye	ear.		
_	· · · · · · · · · · · · · · · · · · ·		unity-based project committee may be listed on the back of this	
Member Name	Ti	tle	Signature	
1				
2				-
3				
4				
5				
6				•
7				
8				
9				
10				
Administrator's Pledge of Sup	port:			•
o support the activities conduct	ed for which this lly, I agree to sup	funding is inten	tion is accurate and complete. I ded, including all conditions of rm maintenance of the heart rate	gran
Principal's name (please print	·):	Principal's sig	nature:	Ī

# **School Wellness Grant Application Scoring Criteria**

Category		Reader's Score		
		Med	High	
Grant Application Requirements: 5 points	0-1	2-3	4-5	
Application received by deadline with 6 copies (1 pt.)				
Grant committee named with all required members (1 pt.)				
Principal signature provided (1 pt.)				
Application sections complete (2 pts.)				
Physical Education Program Description: 15 points	0-5	6-10	11-1	
Number of students and grade levels (2 pts.)				
School graduation requirement for physical education (1 pt.)				
Physical education schedule (2 pts.)				
Number of physical education teachers (2 pts.)				
Content of physical education courses (8 pts.)				
Need and Readiness: 10 points	0-4	5-7	8-10	
Heart rate monitor experience (2 pts.)				
Fitness concepts in the PE program (8 pts.)				
Collaboration and Coordination: 10 points	0-4	5-7	8-10	
<ul> <li>Project coordination with existing school, supervisory union and/or community- based initiatives (4 pts.)</li> </ul>				
Collaboration with other content area specialists (6 pts.)				
Implementation Objectives and Timelines: 40 points	0-15	16-30	31-4	
<ul> <li>Objectives identified for each project goal including assessment of student learning (30 pts., 10 pts. per goal)</li> </ul>				
Achievable timeline proposed (5 pts.)				
Persons responsible identified (5 pts.)				
Overcoming Barriers: 10 points	0-4	5-7	8-10	
• 2-3 barriers described (4 pts.)				
Solutions to barriers proposed (6 pts.)				
Proposed Project Budget: 10 points	0-4	5-7	8-10	
Costs are essential to the project (5 pts.)				
<ul> <li>In-kind donations are identified (5 pts.)</li> </ul>				

#### **Narrative Questions**

#### 1. Physical Education Program Description: 15 points

- a) How many students are enrolled in each physical education course? What grade levels do these students represent?
- b) What is the school graduation requirement for physical education?
- c) How often and for how many minutes do physical education classes meet?
- d) How many physical education teachers make up the physical education department?
- e) Describe the content of your school physical education courses. Describe how your program is working toward a contemporary model of high school physical education.

#### 2. Need and Readiness: 10 points

- a) Describe if and how members of your physical education department have used heart rate monitors either as instructional tools or for personal reasons. Which models and how many heart rate monitors are currently being used? If your department does not have experience with heart rate monitors please state this.
- b) Describe how fitness concepts are currently integrated into the physical education program. Do you assess student fitness? If so, how? Which specific fitness assessments are implemented and when? How do you currently use these fitness assessment data?

#### 3. Collaboration and Coordination: 10 points

Wellness-enhancing initiatives have greater impact when implemented in a coordinated and collaborative fashion within the whole school community.

- a) Discuss how the project will be coordinated with existing school, supervisory union and/or community-based initiatives.
- b) Describe how the project will be coordinated with other content areas specialists (ex: health, mathematics, technology, science, language arts) to develop and implement cross-content lessons related to the use of heart rate monitors in physical education. Attach sample lesson plans as appropriate.

#### 4. Implementation Objectives and Timeline: 40 points

Using the format shown on page 11, describe how your school physical education program will support the overall goals of this project. (Goals are listed on page two.) Detail specifically how student knowledge and skills will be assessed. Select objectives that will lead to achievement of each goal then identify personnel responsible for each objective and a deadline for task completion. The timeline for this grant project is relatively short, so select objectives that can be completed by June 30, 2010.

- a) Identified objectives should directly link to each goal and should describe how student knowledge and skills will be assessed.
- b) The timeline should include anticipated dates of completion for objectives and personnel responsible for each task.

#### 5. Overcoming Barriers: 10 points

- a) Describe two to three potential barriers which could limit or prevent implementation of heart rate monitors in your physical education program.
- b) Propose solutions to each barrier.

#### **6. Proposed Project Budget: 10 points** (Not counted as part of the four-page limit.)

Provide an itemized budget. Costs should be directly linked to the project goals and objectives. **Total funding request of the grant shall not exceed \$9,000.** Applicants may replicate the sample budget table shown on page 13. In order to regularly document student heart rate data, it is suggested that applicants budget for one complete class set of Polar E-600 downloadable heart rate monitors, plus necessary support technology. See the Polar Electro Inc. Education Product Price List included as Appendix C. In addition, proposals will be enhanced by the inclusion of in-kind support listed as part of the budget.

### **Sample Objectives and Timeline**

The sample objectives and timeline below outline a potentially fundable project. This is not necessarily an ideal proposal.

### **Sample: Objectives and Timeline**

It is our intention to spend the 2009-2010 school year developing and piloting a heart rate monitor program in one tenth grade physical education class. Then, after careful program evaluation and adjustment we hope to expand the program to other grades in future years.

Please use the below table format for the objectives and rimeline.

Goal 1: Document and increase the amount of time high school students spend engaged in moderate to vigorous physical activity during physical education.

	Objectives	Person(s) responsible	Date of Completion
a)	Set up computer and software for heart rate monitor data collection.	One physical educator and technology specialist	10/31
b)	Review and select/develop heart rate monitor lessons and assessments for one tenth grade PE class.	Physical education dept.	10/31
c)	Collect baseline data on student achievement of moderate to vigorous physical activity.	Physical education dept.	11/15
d)	Adjust tenth grade PE curriculum to include more moderate to vigorous physical activity.	Physical education dept.	11/30
e)	Attend heart rate monitor training provided by the Vermont Department of Education.	Physical education dept.	TBD

Sample Objectives and Timeline continued on page 12.

Goal 2: Develop student self-knowledge, personal goal setting and fitness planning skills for lifetime physical activity.

	Objectives	Person(s) responsible	Date of Completion
a)	Design and set up a standards-based assessment system using PE Manager.	Physical education dept.	10/31
b)	Implement FITNESSGRAM pre-assessments including PACER, curl-ups, trunk lift, modified pull-up, & back-saver sit and reach.	Physical educator	9/30
c)	Implement lesson(s) on goal setting.	Health educator	10/31
d)	Implement lesson(s) on fitness plan development.	Physical educator	11/30
e)	Implement lesson(s) on circulatory and respiratory system structures and functions.	Tenth grade biology teacher	1/31
f)	Implement FITNESSGRAM post-assessments.	Physical educator	4/30
g)	Implement final student assessment of goal setting and personal fitness plan development based on individual student heart rate monitor data and FITNESSGRAM results.	Students and physical educator	6/1

Goal 3: Develop students' 21<sup>st</sup> century skills of tracking, interpreting and evaluating personal physical activity effort with objective technological measures.

	Objectives	Person(s) responsible	Date of Completion
a)	Implement daily student use of heart rate monitors in one tenth grade PE class.	Physical educator	11/1 – 6/1
b)	Download student heart rate data after each lesson.	Students and physical educator	11/1 – 6/1
c)	Implement lesson(s) and assessment on analysis of heart rate data.	Mathematics teacher	2/28
d)	Share aggregated student heart rate data and final program evaluation with Vermont Department of Education.	Physical educator	6/30

# **Sample Budget**

Please use the below table format for the budget which will not be counted as part of the four-page limit.

See appendix C for the 2009 Polar Electro Inc. Education Price List.

Category	Description of Expense	Cost
Itemized supplies, such as:	1 PE 360 Technology Package	\$3999
Heart rate monitor equipment	12 Polar E-600 heart rate monitors (\$276 each)	\$3312
Educational resources     Other - describe	24 additional straps (\$6 each)	\$144
• Other - describe	2 Classroom Management System	\$70
	05-200/600 Instructional Banners (2)	\$59
	NASPE Heart Rate Assessment Book	\$13
	1 gallon Simple Green d pro 5 disinfectant	\$25
	1 laptop computer	\$700
	Shipping	\$100
Personnel costs, such as:  • Substitute teacher payment to release committee members from classes  Other - describe	3 x 2-day substitute teacher pay (\$70 per day) to release PE team to attend required heart rate monitor (HRM) training	\$420
In-kind donations, such as:     Printing supplies     Teacher release time     Mileage     Other - describe	100 miles x 2 PE teachers x \$0.505/mile to attend HRM training	\$0
Total		\$8842

# Appendix A

The minimum hardware system requirements for the Polar E series software are:

- Windows 98se or later
- Pentium 200 MHz processor
- Super VGA or higher resolution monitor
- 64 MB RAM
- CD-Rom Drive
- PC with sound card (compatible with Sound Blaster) and dynamic loud speakers or headphones
- Polar IR Interface (for the E600 downloading, USB)

# Appendix B

Resources:

Vermont Nutrition and Fitness Policy Guidelines:

http://education.vermont.gov/new/pdfdoc/pgm\_nutrition/school\_nutrition/policy/nutrition\_poicy\_guidelines\_1008.pdf

Polar USA, Schools and Educators:

http://education.polarusa.com/education/

NASPE's Physical Best Program:

http://www.aahperd.org/naspe/physicalbest/

FITNESSGRAM, fitness assessment resources:

http://www.fitnessgram.net/home/

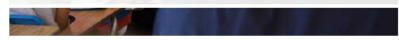
Fitness for Life, physical education curricular resources:

http://www.fitnessforlife.org/

# Appendix C



# **Education Price List**



#### TRIFIT™ SYSTEM AND SOFTWARE

TriFIT 700 System\$8,395
TriFIT 620 System
TriFIT Software

#### TRIFIT SYSTEM OPTIONS

AutoBike, Interactive Testing Bike	\$2,999
Treadmill – 110 volt, System Interface and Software	\$7,865
Treadmill – 220 volt, System Interface and Software	\$7,865
Resting Blood Pressure and Heart Rate System	\$830
Lange Skinfold Caliper Upgrade	\$669
Tanita* Scale	\$1,045
Network Ready (10/100, TriFIT networking software)	\$520
TriFIT 620 Portable Case	\$515
TriFIT 700 Cart	\$1,565

#### TRIFIT SOFTWARE OPTIONS & MODULES

Health Risk Appraisal	\$995
Meal Planning	\$620
Group Reporting	\$620
Template Builder	\$620
Networking Option	(5 simultaneous users) \$1,575
Networking Option	(10 simultaneous users) \$3,150
Networking Option	(30 simultaneous users) \$4,725





#### PE STUDENT PORTAL

School License......TBD

#### COMPANION™ POCKET PC

Color Pocket PC with Pocket TriFIT & Pocket PE Manager™ Software..\$672

Pocket TriFIT/Pocket PE Manager Data Collection Software.........\$410 (sold separately for Pocket PCs)

#### PE MANAGER SOFTWARE

Single PC License\$515 (includes software enhancements for one year)
Multiple PC Licenses* (includes software enhancements for one year)
1-5 PCs\$1,250
6-10 PCs\$2,090

<sup>\*</sup>Limited to single building, networking capability included

# E SERIES HEART RATE MONITORS (HRMS)

HRM	Product #	TIER 1 <\$2,499	TIER 2 <\$9,999	TIER 3 <\$99,999	TIER 4 >\$100,000
E600 Downloadable HRM	902680	\$276	\$266	\$250	\$231
E200 HRM	902670	\$154	\$150	\$142	\$138
E40 HRM	90029855	\$83	\$79	\$75	\$73

Note: Each HRM comes with T31c coded transmitter and small elastic strap. Each E600/E200 order includes PC compatible E Series Software CD-ROM.

#### **ELASTIC STRAPS**

SIZE	Product #	TIER 1 < \$2,499	TIER 2 < \$9,999	TIER 3 < \$99,999	TIER 4 >\$100,000
X-small (18" to 27")	82017731.01	\$6	\$6	\$5	\$4
Small (23" to 47")	82017733.01	\$6	\$6	\$5	\$4
Medium (25" to 54")	82017729.01	\$6	\$6	\$5	\$4
Large (27" to 63")	820093.01.02	\$6	\$6	\$5	\$4



COMPANION POCKET PC





TRANSMITTERS	Product #	Price	
T31c coded transmitter	810542	\$34.50	
T31c coded transmitter set (includes strap)	920135	\$38.00	

SUPPORT MATERIALS	Product #	Price	
E600 PC Interface (USB)	91025025	\$28	
E200/600 Student Instructional Banners (2)	19933063.00	\$59	
Class Management System (CMS) Bag	488009.01.01	\$69.99	
Lessons from the Heart Text	199023	\$19 Tier 1	
		\$19 Tier 2	
		\$18 Tier 3	
		\$17Tier 4	



#### POLAR PE360 TECHNOLOGY PACKAGE.....

12 E600 downloadable HRMs

- 1 Class Management System (CMS) Bag
- 1 E600 PC Interface
- 1 Companion Pocket PC
- 1 PE Manager Software CD

#### TRAINING

E Series Heart Rate Monitors 1 Day*	\$1,575
TriFIT 700/620 2 Days**	\$2,625
PE Manager 2 Days**	
PE Student Portal (1) 3-Hour Session	\$368
Virtual Learning Classroom (3) 1-Hour Sessions	\$368
Follow Up 1 Day	\$1,575

- 2-day E Series heart rate monitor training is available for \$2,625.
- \*\* 1-day training is available for \$1,575, however it only covers basic functions of the software.

#### TECHNOLOGY WORKSHOPS

Specialist Program 3 Days	\$1,575
JumpStart Program 3 Days	\$2,500
University JumpStart Program 3 Days	\$13,900



TRAINING

#### TECHNICAL SUPPORT AND WARRANTY

Priority Plan Annual Renewal\*

For sites with PE Manager and/or TriFIT Software only ......\$290 (\*Per site, includes software enhancements and toll-free technical support)



Please contact Polar for complete warranty information for all products.

Prices effective April 1, 2008. Shipping, handling and tax/duty, when applicable, additional on all orders — please call for quote.

Prices subject to change without notice.



#### CONTACT INFORMATION

POLAR ELECTRO INC. 800.290.6330 | Fax: 516.355.7945 e-mail: education.division@polar.fl www.polarusa.com/education





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